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Conference Abstract

Digitisation at Three UK Herbaria Contributes Towards Food Security and Sustainable Timber Use

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Abstract

The digitisation of herbarium collections has shown to provide a growing resource in conservation science. Mobilising the data on portals such as GBIF allows researchers to access key taxonomic, habitat and geographical data that would otherwise be unavailable unless institutions are physically visited. These data are used notably in conservation assessments, distribution studies and publication of new species (Canteiro et al. 2019).

The herbarium specimens held in Royal Botanic Gardens Kew, Natural History Museum, London, and the Royal Botanic Garden Edinburgh are an unparalleled resource, estimated to hold representatives of around 85% of known plant species. By working collectively for the first time on a non-type material digitisation project, the three institutions collaborated to generate data for the subtribe Phaseolinae and rosewoods totalling 37,000 legume specimens.

This pilot project was made possible through Department for Environment Food & Rural Affairs (DEFRA)-allocated, Official Development Assistance (ODA) funding. This aid money is distributed by the UK government in its “global efforts to defeat poverty, tackle instability and create prosperity in developing countries”. This project focused on two case-studies:

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Study i. Supporting development of dry beans as a sustainable and resilient crop. Beans from the subtribe Phaseolinae, including cowpeas, lablab and wild beans, are extremely tolerant of poor-quality soils and drought. As a consequence they are particularly suitable for the low-input agricultural production systems. An estimated 14.5 million hectares of land is used for planting of cowpea each year with around 80% of that in Development Assistance Committee countries in sub Saharan Africa.

Study ii. Aiding conservation and sustainable use of rosewoods and padauk (*Dalbergia* L.f. and *Pterocarpus* Jacq.). *Dalbergia* is distributed throughout tropical Asia, Africa and the Americas with many species being regionally endemic. Species also vary in habit from shrubs and trees to robust lianas. *Pterocarpus* is also pantropically distributed in a wide variety of habitats. However, suitable habitat across the natural range of these genera is now limited for many species due to a range of threats, namely deforestation, forest conversion for agriculture/human development, and logging.

The timber from many species of *Dalbergia* and *Pterocarpus* has long been prized for its high-quality wood used for construction, fine furniture, cabinet work, marquetry and inlay, ethnic carvings, pianos, guitars and other musical instruments. All *Dalbergia* and most of the timber species of *Pterocarpus* are now listed on the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix II and the Brazilian *D. nigra* is listed on Appendix I. There is a huge illegal trade in these genera and serial depletion across the globe is a real and substantial risk to their survival (Winfield et al. 2016).

This project used novel high-throughput methodologies and acted as a pilot study for future collaborative mass digitisation efforts. Specimens were taken from the collections, barcoded and minimal data fields captured, before high resolution images were created and the specimens returned. A subset of these was further subjected to full or partial label transcription via the use of the Atlas of Living Australia's DigiVol crowdsourcing platform or via in-house data capture.

The resulting datasets will be made available via GBIF and partner sites and will be used to perform gap analyses on the collections across the institutions. We will examine the benefits of combined institutional data for these groups, assess how many species are represented in total and the geographic coverage of these collections. Use of the data will be measured by the number of downloads from GBIF and observing in-house use cases. Two research projects have just begun within Kew, using the data gathered for *Pterocarpus* and *Lablab* Adans., georeferencing for which is already underway and will contribute to conservation assessments and other measurable outputs. A data paper is planned which will also assist with tracking future use of the data set and help demonstrate the impact of the digitisation.

Keywords

digitisation, herbaria, data, collections, Pterocarpus, Dalbergia, Phaseolinae, species, specimens, rosewoods, beans, timber

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